Greenhouse

- Structure for growing plants that is:
  - Covered with transparent material (glazing) to admit natural light
  - Is artificially heated
  - Is tall enough for people to walk in
Glasshouse

Hobby Greenhouse

Retractable roof greenhouse

Hotbed
- Artificially-heated but not tall enough for people to work in

Cold frame
- Not heated or minimally heated
- May or may not be tall enough for people to work in

High tunnels
Hoop houses
- Unheated, single-layer plastic-covered structures
- Crops grown in ground beds
- Structure may be moveable
- Extend production seasons
High tunnels in S. Europe

Saran house Shade structure

- Usually have no sides
- Shade cloth reduces light intensity
- Provides protection from wind
- Not artificially heated

Greenhouse range

- Two or more greenhouses in one location
  - Single-span
  - Multi-span

Headhouse / Crosshouse / Service building

- Building associated with greenhouse
  - Multi-purpose
    - Stage shipping
    - Cooler
    - Pesticide storage
    - Employee break room

Headhouse / Crosshouse / Service building

- Used for operations that support production
- Not used for production

Lean-to

- One side of greenhouse is solid wall
- Hobby and school greenhouses
Sawtooth

- Roof (rafters of individual house) slopes in only one direction and is connected along side posts

Even-span

- Two roof slopes of same pitch and width

Uneven-span

- Rafters are of unequal length, which makes structure adaptable to hill

Arched roof vs. Gable roof (A-frame)

Quonset vs. Gothic

Greenhouse ranges

- Ridge and furrow
- Gutter-connected
Single-span vs. Multi-span

• Advantages and Disadvantages?

Multi-span

High profile vs. Low profile

Gable volume = 5,500 ft³

Gable volume = 1,700 ft³

High profile

Distance between gutters is wide, usually > 15'
Slightly cheaper to cool, but more expensive to heat

Low profile

Distance b/n gutters is short, about 11-12'
Slightly cheaper to heat, but more expensive to cool

High profile or low profile?

Conservatory
Plant Sciences Cntr
Univ. of Illinois
Urbana, IL
High profile or low profile?

“The White House”
Schaefer’s Greenhouses
Aurora, IL

Purlins and Sash bars

Purlin posts

Truss frame

Truss frame – Poly glazing

Caulking between sash bar and bar cap

Laying panes on sash bars

Sash bar

Purlin

Poly glazing greenhouse

Sterling poly greenhouse

Clear Span

Bottom chord

Struts and chords

Side post

Purlin Posts

Knee brace

Cross bar

Columns or posts

Strut
### Cost of high tunnel construction

<table>
<thead>
<tr>
<th>Item</th>
<th>PVC Frame</th>
<th>Metal Frame</th>
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</thead>
<tbody>
<tr>
<td>Structure w/cover</td>
<td>$0.75-1.00/ft²</td>
<td>$1.00-2.50</td>
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<tr>
<td>Labor to erect</td>
<td>$0.50</td>
<td>$0.50</td>
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<tr>
<td>Heating system</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Cooling system</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Plumbing/wiring</td>
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<td>--</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>$1.25-1.50</td>
<td>$1.50-3.00</td>
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### Cost of greenhouse construction

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<thead>
<tr>
<th>Item</th>
<th>Polyethylene</th>
<th>Glass</th>
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<tbody>
<tr>
<td>Structure w/cover</td>
<td>$3.50-4.50/ft²</td>
<td>$7.00-8.00</td>
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<td>Labor to erect</td>
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<tr>
<td>Cooling system</td>
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<td>$1.50-2.50</td>
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<tr>
<td>Plumbing/wiring</td>
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<td><strong>Subtotal</strong></td>
<td>$10.50-11.50</td>
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